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Semblanzas Ictiológicas Iberoamericanas
Tiago Pinto Carvalho

Hugo L. López
y
Justina Ponte Gómez

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“El tiempo es invención o no es nada en absoluto”. Henri Bergson

“El tiempo es olvido y es memoria”. Jorge. L. Borges

A través de esta nueva serie tratamos de conocer diferentes aspectos personales de los integrantes de la comunidad ictiológica iberoamericana.

Esta iniciativa, comparte el espíritu y objetivo de las semblanzas nacionales buscando informalmente, otro punto de unión en la “comunidad de ictiólogos iberoamericanos”.

Quizás esté equivocado en mi apreciación, pero creo que vale la pena este intento, ya que, con la colaboración generosa e insoslayable de los integrantes de este “universo”, señalaremos un registro en el tiempo de la *Ictiología Neotropical*.

Hugo L. López

“O tempo é uma invenção ou não é nada em absoluto”. Henri Bergson

“O tempo é olvido e é memória”. Jorge. L. Borges

A través desta nova série, tentamos conhecer os diferentes aspectos pessoais dos integrantes da comunidade ictiológica ibero-americana.

Esta iniciativa compartilha o espírito e o objetivo das biografias de pesquisadores brasileiros, procurando, informalmente, outro ponto de conexão na “comunidade de ictiólogos ibero-americanos”.

Talvez esteja equivocado na minha apreciação, mas creio que esta tentativa compensa, já que, com a colaboração generosa e voluntária dos integrantes deste “universo”, marcaremos um registro no tempo da *Ictiologia Neotropical*.

Hugo L. López

Semblanas Ictiológicas Iberoamericanas

Tiago Pinto Carvalho

Río Manapiare, San Juan de Manapiare, Amazonas, Venezuela, 2010

Hugo L. López y Justina Ponte Gómez

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División Zoología Vertebrados
Museo de La Plata
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Juniol, 2014

Imagen de Tapa
Tiago Pinto Carvalho en rio Guamá, Belém, Pará, Brasil, 2010

Imagen de fondo dela Introducción
Porque en realidad nuestro norte es el sur, dibujo de Joaquín Torres García

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Questionário

-**Um livro**: *The Worst Journey in the World*
-**Um filme**: *Inside Man*
-**Uma música**: *Oceans*, Pearl Jam
-**Um(a) ator(atriz)**: Clint Eastwood
-**Um esporte**: futebol
-**Uma cor**: azul
-**Uma comida**: camarão na moranga
-**Um animal**: peixe
-**Uma palavra**: pacífico
-**Um número**: 13
-**Um local**: lago Guaíba
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-**Um nome**: Tahuantinsuyoa
-**Um homem**: Ernest Shackleton
-**Uma mulher**: Andréa
-**Um icitiólogo/a do pasado:** Franz Steindachner
-**Um icitiólogo/a atual**: John Lundberg
-**Um personagem de ficção**: Sherlock Holmes
-**Um super-herói**: Batman

Rio Cadeia, Santa Maria do Herval, Rio Grande do Sul, Brasil, 2006
Carlos Lucena com Tiago Pinto Carvalho

ELEVEN

The Amazon-Paraguay Divide

TIAGO P. CARVALHO *and* JAMES S. ALBERT

The origin of the Paraguayan freshwater fish fauna can be explained by migration.

PEARSON 1937, 107

The Paraguay Basin has drained the heart of South America for tens of millions of years, and the origins of the aquatic species that inhabit this river basin have been the subject of scientific investigation for more than a century. Taxonomic affinities with the adjacent and much larger Amazon Basin were postulated in the earliest studies of the Paraguayan fish fauna (Eigenmann 1906; Eigenmann et al. 1907). In a seminal paper entitled "The Fishes of the Beni-Mamoré and Paraguay Basins, and a Discussion of the Origin of the Paraguayan Fauna," Pearson (1937) provided a very modern discussion of the reasons for the similarities of the fishes of these two large tropical river systems. One of the main points of this paper is that the Paraguayan freshwater fish fauna did not evolve in isolation from that of adjacent regions. Pearson showed how the taxonomic composition of the Paraguay Basin can be explained largely by migration from southern tributary headwaters of the Amazon Basin: the Mamoré-Guaporé, Tapajós, Xingu, and Tocantins rivers. In particular, he noted the close similarity of the Mamoré (in the Upper Madeira watershed) and Paraguay basins in terms of areal extent, ecological and environmental settings, and overall physiognomy (geographical and geological features), which he suggested contributed to the rich faunas of the two basins. Pearson's data supported Eigenmann's view (e.g., Eigenmann 1909) that phylogeny, as opposed to convergent adaptation (Haseman 1912), best explains the similarities observed between the two faunas.

Pearson did not fail to note that the lowland divide between the Paraguay and adjacent Amazonian basins provides a suitable landscape for the movement of fishes. Elisée Reclus (1895) had earlier noted that the headwaters of the Guaporé and Paraguay scarcely exceed 1,650 feet (500 m) in altitude, and that the Rio Jauru (Paraguay Basin) approaches so near to affluents of the Guaporé Basin, and on such a flat landscape, that a temporary connection between the two systems regularly forms during the rainy season. At one point (15°50′ S, 59°18′ W) the Rio Aguapeí (affluent to the Jauru) is separated from the Alegre (tributary to the Guaporé) by a narrow isthmus of slight elevation not more than five kilometers wide. Reclus (1895) also mentioned that in 1772 an artificial canal had been cut through the divide between these rivers, large enough to admit a six-oared boat, although attempts to maintain a permanent communication between the two waterways proved unsuccessful. Eigenmann (1906; Eigenmann et al. 1907) had also suggested the Guaporé-Paraguay divide as a possible dispersal route between the river basins, although no actual instances of such migrations have ever been documented and the actual effect of seasonal connections on the fish fauna of these two drainages remains poorly known.

As part of the Thayer Expedition (Agassiz 1868) and in his work for the Geological Commission of Brazil, Charles Fredrick Hartt (1870) first charted the watershed boundaries of the Xingu, Tapajós, and Paraguay basins, before his death from yellow fever in 1878 (Lopes 1994). According to Hartt (1870), the headwaters of the Paraguay and Tapajós basins rise on a plain within few miles of one another near the town of Diamantino (14°24′ S, 56°21′ W), on a level plain having no mountainous character, being simply a high range of country varying little in its general elevation though deeply grooved by the river valleys. David Starr Jordan (1896) stated that the marshy character of the uplands between the Tapajós and Paraguay rivers would permit the free movement of fishes between the two basins. Also, Eigenmann and colleagues (1907) observed that there are many places at the edge of the plateau farther to the east where a simple cut of few meters would connect Amazon and Paraguay tributaries, as between the Rio Estivado (tributary to the Tapajós) and Tombador (tributary to the Paraguay) where the divide is no more than 100 meters.

Pearson's list (1937, 108) was the first to systematically compare the fishes of the Beni-Mamoré and Paraguay basins, reporting 176 species common to the Paraguay and Amazon basins, and 120 species common to the Paraguay and Beni-Mamoré basins. Here we provide an update of Pearson's list (Table 11.1) including ichthyofaunal information about the Tapajós and Xingu basins. We delimit areas by drainage basin (Figure 11.1) with boundaries similar to those proposed by the Freshwater Ecoregions of the World (Abell et al. 2008), with some differences noted. We use these species distributions in combination with information from phylogenetic relationships and the geomorphological history of the region to evaluate alternative models of vicariance and geodispersal

Historical Biogeography of Neotropical Freshwater Fishes, edited by James S. Albert and Roberto E. Reis.

Neotropical Ichthyology, 9(3): 457-469, 2011

Redescription and phylogenetic position of the enigmatic Neotropical electric fish *Iracema caiana* Triques (Gymnotiformes: Rhamphichthyidae) using x-ray computed tomography

Tiago P. Carvalho and James S. Albert

We redescribe *Iracema caiana*, a monotypic genus of the gymnotiform electric fish family Rhamphichthyidae. *Iracema* is known only from the type series (holotype and three paratypes) collected from the rio Jauaperi, affluent to the rio Negro in the Amazon basin, and was never collected again. Previous morphological studies were limited to features of external morphology. To study the osteology of *Iracema* we examined two specimens of different sizes using high-resolution x-ray computed tomography, a non-invasive and non-destructive technique to visualize internal anatomical structures. We describe and illustrate the osteology of *Iracema caiana*, and present data on morphometrics and external morphology. Contrary to previous hypotheses we propose that *Iracema* is the sister group to *Rhamphichthys* based on four synapomorphies: intermuscular bones present in the *adductor mandibulae*, reticulated texture of opercles, fully ossified Baudelot's ligaments, and elongate scales above the lateral line in the posterior portion of the body.

Iracema caiana, um genêro monotípico de peixes elétricos Gymnotiformes da família Rhamphichthyidae, é aqui redescrito. *Iracema* é conhecido apenas da série-tipo (holótipo e três parátipos) coletado no rio Jauaperi, afluente do rio Negro na bacia amazônica, nunca sendo coletado novamente. Estudos morfológicos prévios de *Iracema* foram limitados somente à morfologia externa. Neste trabalho, a osteologia do gênero foi examinada com base em dois espécimes de diferentes tamanhos usando-se tomografia computadorizada de alta resolução, uma técnica não invasiva para a visualização de estruturas anatômicas internas. Caracteres externos e morfométricos são apresentados e a osteologia é ilustrada e descrita. Contrariamente a hipóteses prévias, *Iracema* é proposto como grupo irmão de *Rhamphichthys* com base em quatro sinapomorfias: presença de ossos intermusculares no *adductor mandibulae*, textura reticulada do opérculo, ligamento de Baudelot completamente ossificado e escamas alongadas na região posterior do corpo acima da linha lateral.

Key words: Amazon, Biodiversity, Guiana Shield, Osteology, Rare fish, *Rhamphichthys*.

Introduction

Iracema caiana Triques is a member of the Rhamphichthyidae, a clade of Gymnotiformes with 15 valid species distributed in three genera (Ferraris, 2003; Lundberg, 2005; Carvalho *et al.*, 2011). Rhamphichthyidae and Hypopomidae constitute the Rhamphichthyoidea, a well supported clade within Gymnotiformes (Mago-Leccia, 1978; Alves-Gomes *et al.*, 1995; Albert, 2001). *Iracema* Triques was originally based on a unique combination of characters of external morphology. According to Triques (1996a) *Iracema* can be differentiated from other rhamphichthyids by the presence of one series of irregular to roundish blotches on the sides of the body; a broad and uniformly dark pigmented stripe along the dorsal margin of the body; and an intermediate number of anal-fin rays between *Rhamphichthys* Muller and Troschel, and *Gymnorhamphichthys* Ellis. Triques (1996a) briefly discussed putative relationships of *Iracema* within other rhamphichthyids, hypothesizing it as the sister group to *Gymnorhamphichthys* based on the shared loss of scales on the anterior portion of the body.

Iracema was first included in a formal phylogenetic analysis by Albert & Campos-da-Paz (1998), who were able to code only 46 characters-states in a data matrix of 170 characters due to absence of osteological information. Most osteological data on *Iracema* were not available due to a lack of specimens available for clearing and staining; the genus remains known only from four specimens in the type series. To avoid

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Check List
Journal of species lists and distribution

Lists of Species

Fishes from the Las Piedras River, Madre de Dios basin, Peruvian Amazon

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Abstract: We report results of an ichthyological survey on the Las Piedras basin, a tributary of the Madre de Dios River located in the southwestern portion of the Amazon Basin in southeastern Peru. Collections were made at low water (June, 2011) from 180 - 270 m elevation, within the Fitzcarrald Arch. This is the last of four expeditions to the region with the goal of comparing the ichthyofaunas across the headwaters of the largest tributary basins in the western Amazon: Juruá, Ucayali, Purús and Madre de Dios rivers. Twenty-one sites along the Las Piedras River and its tributaries were sampled and a total of 144 species belonging to 32 families and seven orders were captured and identified. The most diverse families were Characidae (34 spp.), Loricariidae (23 spp.), and Pimelodidae (19 spp.).

Introduction

The Las Piedras River, also known as Tacuatimanu, is a white water river that rises in the inner portions of Fitzcarrald Arch and runs about 600 km until its mouth at the Madre de Dios River, upstream the town of Puerto Maldonado in Peru. The Fitzcarrald Arch is an area uplifted during the Pliocene (c. 4 Ma) in association with the subduction of the Nazca ridge (Espurt *et al.* 2007; 2010). Hydrologically, the Las Piedras is classified as a mid- to lowland elevation river with no direct Andean influence (Thieme *et al.* 2007).

Biogeographically, the region is included within the Mamore-Madre de Dios Piedmont Freshwater Ecoregion of the World (FEOW-318; Abell *et al.* 2008). Some work has been done on the fish fauna of the Madre de Dios basin and its tributaries in Peru and Bolivia. At least 325 fish species are known from the Madre de Dios River (Barthem *et al.* 2003). Perhaps the most comprehensive study on the ichthyofauna of the Madre de Dios basin is the one of Barthem *et al.* (2003), which identified 287 species from the region near the mouth of the Los Amigos River in Peru and illustrated 158 species and their habitat characteristics. Several local studies describe the faunal particularities within Madre de Dios River drainage and their tributaries. Those present a fish diversity of 210 species for Manu River (Ortega, 1996); 232 species for Tambopata River (Chang 1998); 95 species to Pampas del Heath (Ortega, 1994); and 52 species for the Inambari River (Palacios and Ortega 2009). However, hitherto no studies have been published for the Las Piedras River.

Here we report the results of an expedition to the Las Piedras River as part of a four-year biodiversity survey project funded by NSF called "Proyecto Alto Purus". The aim of this project is to compare the ichthyofaunas of headwaters across four major basins of the Fitzcarrald Arch: the Ucayali, Yuruá, Purus and Madre de Dios Basins (Carvalho *et al.* 2009; 2011; and Albert *et al.* 2011).

Materials and Methods

Twenty-one localities where sampled in the Las Piedras basin, (12°30'S, 69°13'W), Madre de Dios Department, Peru (Table 1, Figure 1). Collections were made between 180 and 270 meters above sea level (m.a.s.l.) in three major types of environments: river channels and beaches (*ríos*), streams (*quebradas*), and oxbow lakes (*cochas*; Figure 2). Ríos are major rivers more than 10 meters wide; quebradas are small tributary streams less than 10 m, and cochas are oxbow lakes located on the floodplain (*cf.* Barthem *et al.* 2003). All collecting stations were georeferenced (latitude, longitude, altitude) using GPS, and habitats were documented with high resolution digital photographs and written descriptions. Collections were made using standard ichthyological gear, including

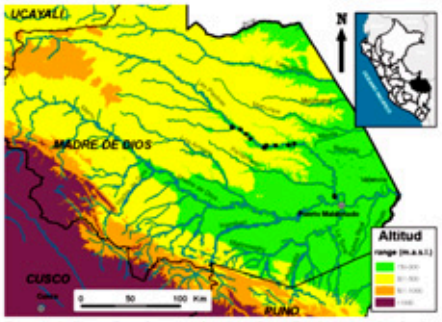

Figure 1. Map of study area showing the collection sites in the Las Piedras River basin, Madre de Dios drainage, Peru.

Amostrando Tecidos, Peixes coleta noturna, rio Jauaperi, Caroebe, Roraima, Brasil, 2011
Tiago Pinto Carvalho com Andréa Thomaz

Coleta Ilha do Mel, Paraná, Brasil, 2013

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